DEPARTMENT OF NATIONAL DEFENCE
CANADA

OPERATIONAL RESEARCH DIVISION

DIRECTORATE OF OPERATIONAL RESEARCH (JOINT & LAND)

DOR(J&L) RESEARCH NOTE 9916

INTELLIGENCE RULE AREA APPLICATION FOR RESEARCH WAR GAMING

BY

Major R.J. Round (RWGT)
and
Dr. P.F. O'Neill (JSORT)

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ABSTRACT

This research note (RN) outlines the use of the Intelligence Rule Area as it is applied to research war gaming in DOR(J&L). Intelligence is the fundamental resource that provides commanders with their understanding of circumstances and conditions on the battlefield. Commanders' perceptions manifest themselves as decisions that can result in combat. In order to conduct research war gaming a methodology is needed that provides the intelligence framework expected before conflict. The Training War Game (TWG) and the Computer Assisted Board Game (CABG) had well developed rule areas that provided for a host of simulation requirements; one of these was the Intelligence Rule Area. Most rule areas have been retired or suspended as computer simulations and simulators continue to dominate the war gaming arena. DOR(J&L) determined that the need continues for development of an intelligence picture prior to engaging computerised models. The Intelligence Rule Area fulfils this requirement. The focus of this RN is to explain how the Intelligence Rule Area evolved, what it entails, and how it is applied.

RÉSUMÉ

Cette note de recherche décrit l'utilisation du Secteur de règles de renseignements tel qu'il est appliqué aux jeux de guerres de recherche au DRO(I&T). Les renseignements sont une ressource fondamentale qui apporte aux commandants une compréhension des circonstances et des conditions présentes sur le champs de bataille. Les perceptions des commandants qui en découlent, se manifestent sous forme de décisions pouvant mener au combat. Pour conduire des jeux de guerre de recherche, une méthodologie est requise afin de fournir les renseignements normalement disponibles avant un combat. Le jeu de guerre de formation et le jeu de guerre sur table aidé par ordinateur possédaient des règles très bien developpées, incluant un secteur de règles pour les renseignements, qui rencontraient les besoins d'une gamme de simulations. La majorité des secteurs de règles ne sont plus utilisés ou sont mis en suspens

maintenant que les simulations et simulateurs informatisés dominent le domaine des jeux de guerre. Toutefois, le DRO(I&T) a conclu que les forces amies ont encore besoin de renseignement sur l'ennemi avant le début d'un jeu de guerre informatisé. Le secteur de règles de renseignements rencontre ce besoin. Cette note de recherche vise à expliquer comment le secteur de règles de renseignements a évolué, ce qu'il contient et comment on l'applique.

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INTELLIGENCE RULE AREA APPLICATION FOR RESEARCH WAR GAMING

I. INTRODUCTION

BACKGROUND

1. Intelligence is the fundamental resource that provides commanders with their understanding of circumstances and conditions on the battlefield. Commanders' perceptions give rise to decisions that can result in combat. In order to conduct research war gaming a methodology is needed that provides the intelligence framework expected before conflict. Simple in concept and application, it must capture the essence of intelligence as embodied in References 1 through 3.

2. The Training War Game (TWG) and the Computer Assisted Board Game (CABG) (References 4 and 5) included well developed rule areas that provided for a host of simulation requirements. One of these was the Intelligence Rule Area. Most rule areas have been retired or suspended as computer simulations and simulators now dominate the war gaming arena. The Directorate of Operational Research (Joint and Land), (DOR(J&L)), determined that the need continues for development of an intelligence picture prior to engaging computerised models. The Intelligence Rule Area fulfils this requirement.

AIM

3. The aim of this Research Note (RN) is to explain how the Intelligence Rule Area evolved, what it entails, and how it is applied.

SCOPE

4. The scope of this RN is that of defining the details of the Intelligence Rule Area. Notwithstanding, the broader aspects of combat functions and the interrelationships with intelligence are also included. This inclusion provides the basis for understanding how the Intelligence Rule Area is applied.

OBJECTIVES

5. The objectives of this RN are to:

a. briefly describe the evolution of the Intelligence Rule Area;

b. describe how the Intelligence Rule Area works; and

c. explain how the Intelligence Rule Area is applied to war gaming.

II. EVOLUTION OF THE INTELLIGENCE RULE AREA

THE REQUIREMENT

Background

6. Decisions are the expected result of intellectual and practical processes. Conflict, and therefore war gaming as conducted at DOR(J&L) as per Reference 6, is based on decision making. Intelligence spans both the intellectual and practical elements of the decision making dynamic. In the case of war gaming, the myriad interactions associated with developing intelligence are not normally available. However, the results of these mechanisms are required. The Intelligence Rule Area provides the results needed to properly set the framework for a new war game or a game in progress.

Continuity

7. The Intelligence Rule Area was initially developed as part of a suite of rule areas. The group was devised and maintained to service the demands of the Training War Game (TWG) and subsequently the Computer Assisted Board Game (CABG). Models and Simulations (M&S) now dominate war gaming. Consequently, the TWG and the CABG were retired by DOR(J&L) at Reference 7. Most rule areas associated with board gaming were retired as well. The Intelligence Rule Area is an exception.

8. War gaming with M&S tools continued to demand an initial framework in order to set appropriate conditions. The Intelligence Rule Area satisfies this demand.

THE DEMAND

9. The Intelligence Rule Area is needed to provide intelligence estimates that are as realistic as can be achieved with respective resources and proportional effort. Levels of war gaming, as with unit and formation levels of military forces, have appropriately increasing capabilities to gather and assess intelligence. A rule area is needed to realistically provide for the expectations at all levels. The degree of reliability is a significant factor when dealing with intelligence development. The Intelligence Rule Area caters to all of these demands and provides acceptable and believable results in all cases.

10. The Intelligence Rule Area fulfils the parameters listed below.

a. It provides for intelligence needs at all levels and in varying degrees.

b. It provides for the gathering of intelligence depending on sources, acquisition methods, tactical and operational scope, and a spectrum of factors that can be expected at varying levels of command.

c. It provides for the war gaming requirement for information and intelligence gleaned by higher headquarters (HQ), and respective resources, e.g. what a battalion can expect from a brigade, division, corps, echelons above corps (EAC) and other processes.

d. It provides for access to respective sub-unit, unit and formation areas of interest and areas of influence.

MEASURES OF EFFECTIVENESS

Methodology

11. The ability of a fighting force to collect and process information and intelligence is determined by its technological and professional structures. High levels of technology and institutionalised processes improve a force's ability to know how the enemy is organised and what it can do.

12. The dynamics of a fighting force, its general capability for intelligence, and the enhancements associated with higher formations and echelons require replication for war gaming. As well as the structure and organisation inherent in forces, a degree of prorated randomisation is necessary for intelligence applications. Capabilities must be consistently applied but results must range through a credible spectrum of outcomes.

Modelling

13. In order to meet the demands of intelligence application, a simple model was developed. It accommodates information and intelligence capacities at varying levels. The model recognises the structures of military forces but is also flexible with respect to variations in force structures. It incorporates random number and radial miss probability systems that assign results consistent with detection likelihood depending on the level of technology applied. The model fulfils the following principal requirements:

a. it suits offence and defence;

b. it takes obstacles into consideration;

c. pre-game consultation establishes tactical levels and assets available for intelligence gathering, e.g. a decision is made on what levels of intelligence will be available for direct contribution to the battle;

d. it provides for the probability of detection at the lowest common levels;

e. it can be applied to moving or static forces;

f. it fits the doctrinal zone sizes ahead of the FLOT (forward line own troops); and

g. it allows for factors to be considered against probabilities in six categories (explained below) of general information and intelligence source levels and technological capabilities.

III. HOW THE INTELLIGENCE RULE AREA WORKS

DOCTRINE

14. The Intelligence Rule Area model allows for information and intelligence consideration within the areas of interest and influence indicated in Reference 3 and illustrated below in Figure 1. These five areas represent overlapping and intertwined territory where unit, formation and higher-echelon information and intelligence gathering resources are applied. The general flow of information from other sources that can transition all areas is considered as a sixth category. Figure 1 presents a simple diagrammatic portrayal of areas of interest and influence.

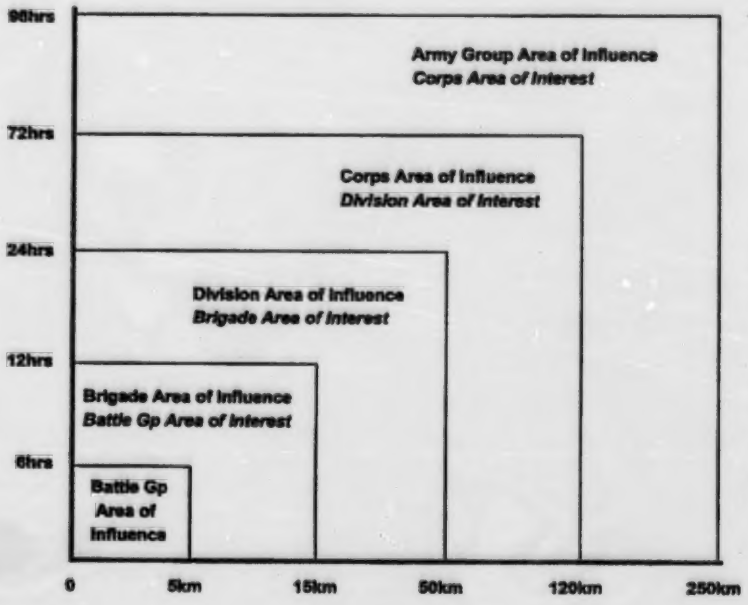

FIGURE 1: AREAS OF INTEREST AND INFLUENCE

STRUCTURE

15. The six categories, which are also included in Annex A, are described below.

a. Category One – General. This category can transcend all areas and all formal information/intelligence gathering instruments and methods. Included in this category are information and human intelligence (HUMINT) sources, local information, rumours, press sources and low level spies.

b. Category Two – Unit. This category encompasses Category One sources plus patrols and PWs.

c. Category Three – Brigade. This includes Category Two sources plus reconnaissance, electronic warfare (EW) resources, limited radar, and helicopter flights.

d. Category Four – Division. This category encompasses Category Three sources plus Unmanned Aerial Vehicles (UAV), air recce, and enhanced EW and radar.

e. Category Four – Corps. This includes Category Four sources plus AWACs, strategic theatre intelligence, and joint resources.

f. Category Six – Echelons Above Corps. This category encompasses Category Five sources plus JSTARs, satellite, strategic, national and international information and intelligence.

ELEMENTS

16. Annex A includes the six categories in three tables: Probability of Detection – Defender; Probability of Detection – Obstacles; and Probability of Detection – Attackers.

a. Probability of Detection – Defender:

(1) The principal horizontal categories are platoon/troop and section. These are the sizes of the segments considered by the game authorities.

(2) The next horizontal group contains Categories One through Six for each sub-unit element. In columns below each

category are the random number envelopes for each detection probability.

(3) The left vertical column has four of the five unit/formation areas. It was considered that at corps level, echelon above corps resources would be available and included.

(4) The next column is an assignment of moving or static for each unit/formation grouping.

(5) Units in defensive positions prepared within the past 48 hours, a probability of detection is applied based on 50% more than the largest figure being assessed in the static status. For example, a static platoon assessed in category one within the 0-15 kilometres (km) zone in this case will have a probability range from 1-(5X50%)=8.

b. Probability of Detection – Obstacles.

(1) Categories One through Six in the horizontal rows are included for obstacles in general. In columns below each category are the random number envelopes for each detection probability.

(2) The left vertical column has four of the five unit/formation areas. It was considered that at corps level, echelon above corps resources would be available and included.

(3) The adjacent column indicates the obstacle status. Linear obstacles are surface laid mined, anti-tank ditches, and the demolition of major installations such as bridges. Point obstacles are craters and abatis.

c. Probability of Detection – Attackers.

(1) The principal horizontal categories are company/squadron/battery and platoon/troop. These are the sizes of the segments considered by the game authorities.

(2) The next row contains Categories One through Six for each sub-unit element. In columns below each category are the random number envelopes for each detection probability.

(3) The left vertical column has four of the five unit/formation areas. It was considered that at corps level, echelon above corps resources would be available and included.

(4) The next column is an assignment of moving or static for each unit/formation grouping.

IV. HOW THE INTELLIGENCE RULE AREA IS APPLIED

GENERAL

17. This model is intended to set conditions between forces prior to commencing a war game, and at specific points during play if required. The Intelligence Rule Area accommodates games beginning at any phase or point of battle so determined by the game authorities. It is possible to employ this model at all level from sub-unit to echelons above corps. The model can be applied to board war gaming, seminar war gaming, and computerised war gaming.

INTELLIGENCE RULE AREA PROCEDURES

Prior To Initial Moves

18. A coherent war game, whether oriented to training or research, requires a game directive. The game directive must include the fundamentals: aim, structures, objectives, and details for the game.

19. Assumptions appropriate to the game and in concert with the directive must be clearly considered and articulated.

20. Prior to applying the model, the game authorities must fix the tactical situation for all forces.

21. The game authorities must establish what information and intelligence can be provided or issued using intelligence reports (INTREP) and intelligence summaries (INTSUM).

22. The game authorities must decide the time period available for intelligence and information gathering.

During Game Play

23. If the game duration permits, established intelligence processing cycles should be respected. These are generally six-hour cycles. It is important to be mindful of the game tempo. Flexibility of the intelligence cycle is realistic depending on the events and circumstances.

24. Artificiality should be avoided where possible. Information and intelligence processes can be modified according to the game play and requirements.

DETAILED APPLICATION OF THE MODEL

25. Listed below are instructions for use of the tables at Annex A. Included are references to Annexes B and C for supplementary instructions.

a. The war game directive and instructions, and the game authorities will direct the probability of detection category (1 to 6) available to the sides and the respective status (moving/static).

b. The authorities will divide the game terrain into segments and apply the model for the defender and then the attacker.

c. The following is an example application (refer to Annex A):

(1) select the category from one to six in the appropriate table box;

(2) compare the appropriate number group with the selected number on the Random Number Table, a sample of which is at Annex B;

(3) if the random number is included in the number group selected, the element is detected and the authorities advise what is revealed, e.g. a company with tanks, etc;

(4) apply a selection from the Radial Miss Table, a sample of which is at Annex C, and offset the detection accordingly;

(5) detection is random but the probability improves as resources available become more sophisticated; and

(6) preparation time, such as digging and defensive works, can be factored appropriately by the game authorities.

d. The game authorities will continue the process until all relevant segments of the game terrain are covered for defenders and attackers.

V. REFERENCES

1. B-GL-300-005/FP-001 Land Force Information Operations (Intelligence Preparation of the Battlefield.

2. B-GL-352 Series – Land Force Intelligence Publications.

3. System Study 1996-2005, The Corps Model, Part 2 – Combat Function Study, Command and Control (3189-1 (DLCD) 13 Jun 91) and System Study 1996-2005, The Corps Model Synopsis of Functional Area Concepts (3189-1 (DLCD) 17 Oct 91).

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5. Computer Assisted War Game (CABG), archived at DOR(J&L), NDHQ.

6. Halbrohr, M. War Gaming in the Directorate of Land Operational Research, RN 94/6, September 1994.

7. War Games Working Group (WGWG), Record of Decisions, 35552-22242-12 (DOR(J&L)) 24 Jul 98.

ANNEX A
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INTELLIGENGE RULE AREA TABLE
PROBABILITY OF DETECTION - *ATTACKER*

		PROBABILITY OF DETECTION											
		COY/SQN/BTY						PL/TP					
ZONE	STATUS												
0-5 KMS	MOVING	1-20	1-30	1-40	1-60	1-80	1-97	1-10	1-15	1-20	1-30	1-40	1-48
	STATIC	1-10	1-15	1-20	1-30	1-60	1-87	1-5	1-8	1-10	1-15	1-30	1-44
5-15 KMS	MOVING	1-15	1-25	1-35	1-40	1-70	1-95	1-8	1-14	1-18	1-20	1-35	1-47
	STATIC	1-8	1-13	1-19	1-20	1-50	1-85	1-4	1-7	1-10	1-11	1-25	1-43
15-50 KMS	MOVING	1-10	1-20	1-18	1-30	1-60	1-93	1-5	1-10	1-9	1-15	1-30	1-46
	STATIC	1-6	1-11	1-13	1-15	1-40	1-83	1-3	1-5	1-5	1-8	1-20	1-41
50-120 KMS	MOVING	1-7	1-8	1-10	1-20	1-50	1-91	1-3	1-5	1-7	1-10	1-25	1-45
	STATIC	1-3	1-6	1-6	1-10	1-30	1-81	1-2	1-3	1-3	1-5	1-15	1-40

CATEGORIES

CAT 1 - GENERAL: REFUGEES, SPIES, RUMOURS.

CAT 2 - UNIT: CAT 1 PLUS PATROLS AND PWs.

CAT 3 - BRIGADE: CAT 2 PLUS RECCE, EW, GROUND RADARS.

CAT 4 - DIVISION: CAT 3 PLUS UAV, AIR RECCE.

CAT 5 - CORPS: CAT 4 PLUS AWACS, STATEGIC THEATRE INTELLIGENCE.

CAT 6 - EAC: CAT 5 PLUS J-STARS, SATELLITE, STRATEGIC NATIONAL INTELLIGENCE.

INTELLIGENGE RULE AREA TABLE
PROBABILITY OF DETECTION - *DEFENDER*

		PROBABILITY OF DETECTION											
		PL/TP						SECTION					
ZONE	STATUS	CAT 1	CAT 2	CAT 3	CAT 4	CAT 5	CAT 6	CAT 1	CAT 2	CAT 3	CAT 4	CAT 5	CAT 6
0-5 KMS	MOVING	1-10	1-15	1-20	1-35	1-40	1-46	1-5	1-8	1-12	1-20	1-30	1-40
	STATIC	1-5	1-8	1-10	1-17	1-20	1-23	1-3	1-4	1-6	1-10	1-15	1-20
5-15 KMS	MOVING	1-8	1-13	1-18	1-32	1-38	1-43	1-4	1-7	1-10	1-17	1-26	1-35
	STATIC	1-4	1-6	1-9	1-16	1-18	1-21	1-2	1-3	1-4	1-7	1-13	1-17
15-50 KMS	MOVING	1-6	1-10	1-15	1-29	1-35	1-40	1-3	1-6	1-8	1-14	1-22	1-30
	STATIC	1-3	1-5	1-8	1-14	1-16	1-20	1-1	1-2	1-3	1-5	1-11	1-15
50-120 KMS	MOVING	1-3	1-6	1-11	1-22	1-28	1-36	1-2	1-4	1-6	1-10	1-18	1-25
	STATIC	1-2	1-3	1-6	1-9	1-13	1-18	1-1	1-1	1-2	1-3	1-9	1-12

NOTE FOR UNITS IN DEFENSIVE POSITIONS PREPARED WITHIN THE PAST 48 HOURS, APPLY A PROBABILITY OF DETECTION BASED ON 50% MORE THAN THE LARGEST FIGURE BEING ASSESSED IN THE STATIC STATUS (EXAMPLE: A STATIC PLATOON ASSESSED IN CATEGORY ONE WITHIN THE 0-15 KM ZONE IN THIS CASE WILL HAVE A PROBABILITY RANGE FROM 1-(5x50%)=8).

		OBSTACLES					
ZONE	STATUS	CAT 1	CAT 2	CAT 3	CAT 4	CAT 5	CAT 6
0-5 KMS	LINEAR*	1-10	1-15	1-20	1-25	1-30	1-40
	POINT**	1-6	1-10	1-15	1-20	1-25	1-35
5-15 KMS	LINEAR	1-8	1-13	1-18	1-23	1-28	1-35
	POINT	1-4	1-9	1-14	1-19	1-24	1-34
15-50 KMS	LINEAR	1-6	1-10	1-15	1-20	1-25	1-35
	POINT	1-2	1-7	1-12	1-17	1-22	1-32
50-120 KMS	LINEAR	1-4	1-9	1-14	1-19	1-24	1-34
	POINT	1-1	1-6	1-11	1-16	1-21	1-31

*LINEAR OBSTACLES - SURFACE LAID MINES, ANTI-TANK DITCHES AND THE DEMOLITION OF MAJOR INSTALLATIONS SUCH AS BRIDGES.

ANNEX B
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RANDOM NUMBER TABLE

The following table is a sample of a random number sheet. These sheets can be produced locally. Game authorities must ensure that once used, random numbers are marked as such.

52	91	22	2	87	2	98	26	14	38	3	48	36	45	8	51
72	40	61	5	76	57	55	51	69	7	54	84	60	14	69	35
27	68	39	37	96	49	28	79	92	48	67	82	3	18	78	73
55	9	42	22	96	41	38	4	56	22	51	60	84	88	84	83
63	50	60	87	27	35	11	35	78	52	54	31	32	55	41	27
73	22	67	96	91	22	74	68	77	15	11	54	50	93	54	87
23	28	100	23	47	99	74	52	3	21	5	65	31	37	90	56
73	55	44	33	68	22	74	52	80	75	74	34	33	35	1	56
49	16	3	30	50	78	44	8	87	42	14	63	34	81	26	44
6	11	58	37	77	45	38	12	65	30	32	32	54	2	71	61

ANNEX C
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RADIAL MISS TABLE

The following table is a sample of a radial miss sheet. These sheets can be produced locally. Game authorities must ensure that once used, radial miss numbers are marked as such.

L2 ON	ON +1	L1 ON	ON ON	R2 ON	L1 ON	ON ON	R2 –4
R1 –1	ON –1	ON ON	ON –1	R1 ON	L1 +4	ON ON	L1 ON
ON ON	ON +1	L1 –1	ON ON	L1 –3	R1 –1	R1 ON	L1 ON
R2 +4	L1 +1	L1 –1	L1 +2	R4 +1	R1 +1	R1 ON	L1 ON
L1 +1	ON +1	L1 ON	R1 +2	R1 –1	R1 ON	L1 ON	R3 +3
R2 +1	ON –1	R1 +2	ON ON	L1 +3	R1-1	ON ON	L4 –1
L1 –3	ON ON	L1 –1	L4 –2	R1 ON	ON +2	R2 –1	ON +1
R2 +2	L1 –1	L2 ON	R2 +1	L1 ON	L2 –1	ON ON	L2 ON

Notes

1. Radial miss is interpreted as a four digit group and read first in azimuth and then in elevation.

2. The numerals are in hundreds and the measure is in metres, e.g. 2 = 200 metres. An example of radial miss applications is provided using - L2 +1.

3. Radial miss is read in relation to the centre of gravity of a detected target, e.g. left 200 metres and add 100 metres. Game authorities will determine if the adjustment is made in relation to their position with respect to the map, or consistently applied in reference to compass cardinal points.

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This research note outlines the use of the Intelligence Rule Area as it is applied to research war gaming in the Directorate of Operational Research (Joint and Land) (DOR(J&L)). Intelligence is the fundamental resource that provides commanders with their understanding of circumstances and conditions on the battlefield. Commanders' perceptions manifest themselves as decisions that can result in combat. In order to conduct research war gaming a methodology is needed that provides the intelligence framework expected before conflict. The Training War Game (TWG) and the Computer Assisted War Game (CABG) had well developed rule areas that provided for a host of simulation requirements, one of these was the Intelligence Rule Area. Most rule areas have been retired or suspended as computer simulations and simulators continue to dominate the war gaming arena. DOR(J&L) determined that the need continues for development of an intelligence picture prior to engaging computerised models. The Intelligence Rule Area fulfils this requirement. The focus of this Research Note is to explain how the Intelligence Rule Area evolved, what it entails, and how it is applied.

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board game
rule area
Intelligence Rule Area
Training War Game (TWG)
Computer Assisted War Game (CABG)
Intelligence Preparation of the Battlefield (IPB)
Areas of Influence
Areas of Interest
probability of detection
Intelligence Report (INTREP)
Intelligence Summary (INTSUM)
Random Number Table
Radial Miss Table